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Cooperative Extension Work in Agriculture and Home Economics.

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AND STATE AGRICULTURAL COLLEGES
COOPERATING.

STATES RELATIONS SERVICE,
OFFICE OF EXTENSION WORK, SOUTH.
FARMERS' COOPERATIVE DEMONSTRATION WORK.
Washington, D. C.

INSECT PESTS AND DISEASES OF THE TOMATO.

TO CANNING CLUB MEMBERS:

You have already received letters 543 and 591 in which you were told how to select and prepare your tenth acre, how to make hot beds, cold frames and seed boxes, and how to transplant, fertilize, and cultivate your tomatoes.

You may, during the season, have trouble with tomato diseases. At the same time that you try to prevent disease, it will be necessary to look out for insect pests which may do great harm. Then, too, you can fight insect pests and tomato diseases at the same time. You must understand that you can much more easily and cheaply take steps to keep your plants healthy than you can cure them after they become diseased. In fact, if the soil in which you plant your vegetables is infected with some of these diseases, you cannot hope to have healthy plants. It is too late to apply remedies after you see the trouble. You have already been told not to use soil for hot beds or cold frames in which diseased tomatoes grew last year.

INSECT PESTS.

The first insect you may have trouble with will probably be one of the various CUT WORMS which will cut down plants as soon as set out. A good remedy is poisoned bait placed so as to kill these worms before transplanting. Have nothing green growing on the plat for about two weeks before transplanting. Then dip collard, or cabbage leaves, bunches of clover or weeds into a solution of Paris green made by mixing one tablespoonful of Paris green in a bucket of water. Scatter these over the plat in the evening for two or three days before transplanting. Remember that Paris green is a poison and must be handled carefully. Another poison which can be used as a bait after the plants are set out is a mash made by mixing one peck bran and two cups cheap molasses with one ounce (two tablespoonfuls) of Paris green and enough water to moisten the mixture. Cotton seed meal may be used instead of bran, taking one quart of meal to one tablespoonful of Paris green. This is placed in small baits near the plants and may be kept moist under a bit of earth to protect it from the sun. Do not allow chickens or other animals to eat this poison mash. Another way to protect plants from cut worms, which you may have tried, is to wrap each plant when transplanting with a bit of paper which extends about one inch above and one inch below the surface of the ground.

Another insect which may attack your plants in the cold frame or soon after transplanting, is the FLEA-BEETLE, a tiny black jumping beetle which feeds upon the tissue of the leaf. Bordeaux mixture, which we advised for spraying to prevent disease, will also have some injurious effect upon the flea-beetle, but to

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dispose of it and other injurious biting insects, it will be safest to add to the Bordeaux mixture either Paris green or arsenate of lead. For each 10 gallons of Bordeaux, add 2 ounces of Paris green or 10 ounces of arsenate of lead. Keep the mixture well stirred while using. It is necessary to use a spray pump for applying this because unless it is applied in a mist-like spray which coats the leaves thoroughly, it will do no good. If Paris green is used without the Bordeaux, 4 ounces of quick lime to 10 gallons of water must be used to keep it from burning the foliage.

Arsenate of lead is thought to be better than Paris green for such use. Although it costs a little more it is really cheaper, because it gives better protection, is not so likely to burn the foliage and sticks to the leaves better, making fewer applications necessary. Two applications of arsenate of lead will equal four or five of Paris green. Arsenate of lead solution can also be made with less care.

The POTATO-BEETLE sometimes attacks tomato plants, but can be controlled by the spraying or by jarring the beetles into a vessel and destroying them.

The TOMATO HORN worm eats the leaves of the plants and can easily be found. Hand picking and killing is the best way to get rid of them. This large green caterpillar is the larva of one of the sphinx moths, a beautiful creature which I hope you may sometime see flitting through your garden at dusk and getting nectar from tubular flowers with its long beak. This moth lays the eggs which produce these horned caterpillars. You may also find the pupa or winter stage of this insect, which lives in the ground in a brown case having its long beak curved over its body like the handle of a jar.

Another caterpillar which will give trouble is the "FRUIT WORM" which bores into the tomato. In its different generations this same caterpillar lives as the cotton boll worm, and the bud worm of corn. It likes these plants better than the tomato. The fruit worm may be worse if the tomatoes are planted near old cotton or corn fields. Since the moth of this species lays about 500 eggs and there are two, three, or more generations in one season, you will see the advantage of picking off and destroying these worms. Pick off the small tomatoes as soon as infected and either feed them to the hogs or bury them deep in the ground. Spraying with one of the arsenicals mentioned above will help keep this worm out of the fruit. Three weeks or more before fruit ripens, arsenate of lead may be used. Within one week of ripening, if spray is needed use Paris green, which can be more easily washed off the tomato than can the arsenate of lead.

If you have other crops than tomatoes on your tenth acre it is well to know that all insects which can be reached can be poisoned in one of two ways, depending upon their habits. Insects which bite and actually eat the tissue of plants can be killed by the use of arsenic poisons suggested in this letter because they eat the poisoned food. Many insects injure plants by sucking their juices, as do bugs and plant lice. These have to be killed by external poisons which come into contact with their bodies, usually closing their breathing pores and killing them. Soap preparations and kerosene emulsions are used to destroy this class of insects. These preparations must be made with care. Instructions will be sent to any one inquiring for them.

RULES FOR PREVENTING TOMATO DISEASES.

READ AND FOLLOW CAREFULLY.

1. **ROTATION OF CROPS** - do not plant tomatoes in the same soil oftener than once in three years. Find what crop was on the land last year and look out for diseases of other plants which may also infect tomatoes. One of the most serious of these is root-knot which occurs in sandy soils. You can tell it by the knots or galls on the roots. These are caused by very tiny worms called nematodes. Root-knot attacks cotton, cowpeas, melons, okra, beets, tomatoes, potatoes and other plants. Soil can only be freed from this pest by planting it for two or three years in crops which are not attacked by the root-knot, such as Iron cowpeas, corn, oats, velvet beans and peanuts. Be sure that you do not plant your tomatoes where any crop was infected with root-knot last year.

2. **Avoid use of fresh manure.** If you did not have well rotted manure plowed under last fall, it will be best not to use any. Using fresh manure in the spring will probably cause disease among your plants.

3. **SPRAY** healthy plants with Bordeaux mixture to protect from disease.

4. Keep plants in good condition by **CAREFUL CULTIVATION**.

5. Pull up and **BURN** all diseased plants promptly.

SPRAYING TOMATOES. To get the best results, spraying with Bordeaux mixture should be begun while the plants are young. Spray once about five days before transplanting, then again five days after transplanting and repeat every ten days until the fruit is full grown. A hard rain will frequently wash off the mixture and make it necessary to spray again. Five sprayings should be given during the season. Ten gallons of spray mixture will be necessary for each spraying. Five pounds blue-stone and five pounds of fresh stone lime will be enough for the season. Secure these supplies at the beginning of the season. Have the blue-stone divided into five one pound-lots. The entire quantity of lime may be slaked at the beginning by adding water slowly until all the lumps are slaked. Keep this slaked lime in a bucket with a little water over it. As long as it is covered with water it is good, but if it is exposed to the air it will dry out and become air slaked. Lime which has been air slaked cannot be used in Bordeaux mixture.

BORDEAUX MIXTURE. How to make for each spraying.

| | |
|------------------------------------|----------|
| Copper sulphate (blue-stone) | 1 lb. |
| Quick lime | 1 lb. |
| Water | 10 gals. |

BLUE-STONE SOLUTION. Put 5 gallons of water in a wooden tub. Tie the blue-stone in a coarse sack and hang it in this water near the top. Do not use a metal vessel because the action of the blue-stone on the metal will ruin the vessel. Allow several hours for the blue-stone to dissolve. This can be done more quickly by using hot water.

LIME SOLUTION. Take one-fifth of the lime which has been slaked by water and mix it thoroughly in 5 gallons of water.

MIXING. Bordeaux mixture is made out of equal parts of these two solutions. It is important that they be carefully mixed, and that only as much of the mixture be made as can be used at one spraying. Have the lime solution in one vessel and

the copper sulphate solution in another. Have ready a third tub or other wooden vessel. Stir the solution well before using. Let two people pour the two solutions into the third vessel at the same time, stirring constantly to insure thorough mixing. Always stir the Bordeaux mixture before putting into the sprayer.

To be of value, spraying must be thoroughly done. The spray mixture must cover the under side of the leaves as well as the upper side.

For the tenth acre, a bucket spray pump costing about \$3.00, or a knapsack sprayer costing about \$5.00, will be satisfactory. Every farm should have one of these sprays, which can be used for many purposes and will more than pay for itself in one year. Wash the spray pump thoroughly after each using.

You will find below a chart which gives a description of some of the more important diseases of the tomato and ways of preventing them.

APPROVED:

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CHIEF.

SINCERELY YOURS,

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ASSISTANT IN HOME DEMONSTRATION WORK

INFORMATION CONCERNING TOMATO DISEASES

| Disease | Roots | Stem | Leaves | Fruit | Means of Infection, Etc. | Other Plants Infected | Prevention or Control |
|------------------------------------|------------------------|---|--|--|--|---|---|
| Tomato Wilt (Fusarium) | Rotten or black inside | Outside normal, inside black | Turn yellow and die | Ripen prematurely | Fungus in soil attacks root and stem | | Rotate crops; burn diseased plants |
| Early blight (Alternaria Solani) | Normal | Sometimes sunken black spots | Brown or black spots; leaves die and fall | Often black circular rotten spots | Wind and insects carry spores to leaves | Probably causes the Irish potato blight | Spray with Bordeaux Mixture |
| Root-knot | Galls or knots | Normal | Gradually turn yellow | Normal | Nematodes in soil | Many others (see list above) | Grow crops not attacked by nematodes for 2 or 3 years |
| Sclerotium blight | Normal | Covered near soil with white mold | Wilt gradually from top downward | Normal | Fungus in soil | Peppers | Prune and stake to allow air to circulate near ground; rotate crops |
| Southern Tomato blight (Bacterial) | Normal | Slightly discolored on inside | Wilt rapidly | Normal | Carried to leaves mainly by biting and sucking insects | Irish potatoes, egg-plant, weeds of same family | Burn infected plants; spray with Bordeaux Mixture |
| Leaf spot (Septoria) | Normal | Normal | Small black spots at first; later whole leaf dies; lower leaves attacked first | Normal | Entrance through leaves; growth favored by rainy weather | | Spray with Bordeaux Mixture |
| Downy mildew (Phytophthora) | | Turns black and dies; often covered with whitish growth | Leaves attacked first, suddenly die and turn black | Brown rot. Tissue near stem first turns black and shrivels | Usually occurs with septoria | Probably causes late blight of Irish potatoes | Spray with Bordeaux Mixture; burn infected plants |
| Blossom end rot | Normal | Normal | Normal | Large sunken black or greenish spots on end | Worse in dry weather | | No remedy known |
| Anthraxnose ripe rot | Normal | Normal | Normal | Large sunken spots, soft rapid decay | Worse in rainy weather | | Preventive measures only; collect and destroy diseased fruit. Prune plants to admit light and air |

